

**WHAT IS CLAIMED IS:**

1. A method of forming arrays of polymers each having a pattern of features on a surface of a flexible elongated web, comprising:
  - (a) at an application station, applying the polymers or their precursor units to the surface;
  - (b) at a reagent station, covering multiple features with a continuous volume of reagent which chemically reacts with precursors or the web;
  - (c) driving the flexible elongated web in a lengthwise direction through the application station; and
  - (d) repeating (a) through (c) as needed to form the arrays along the web.
2. A method of forming arrays of polymers each having a pattern of features on a surface of a flexible elongated web, comprising:
  - (a) at an application station, applying the polymers or their precursor units to the surface;
  - (b) at a reagent station, covering multiple features with a continuous volume of reagent which chemically reacts with precursors or the web;
  - (c) driving the flexible elongated web in a lengthwise direction through the application and reagent stations; and
  - (d) repeating (a) through (c) as needed to form the arrays along the web.
3. A method according to claim 1 wherein the application station is a drop deposition station at which drops containing the polymers or their precursor units are deposited on the web.
4. A method according to claim 2 wherein the application station is a drop deposition station at which drops containing the polymers or their precursor units are deposited on the web.
5. A method according to claim 2 wherein the polymers are DNA.

6. A method according to claim 2 wherein the reagent station of step (b) comprises a reagent bath through which the web is driven.
7. A method according to claim 4 additionally comprising restraining the web on both surfaces on either side of the drop deposition station to assist in maintaining the web flat while in the drop deposition station.
8. A method according to claim 2 wherein the web is driven through a same or different reagent stations such that (b) is repeated on each of multiple surface regions of the web.
9. A method according to claim 8 wherein (b) is repeated with a same surface region of the web passing through different reagent stations.
10. A method according to claim 2 wherein the web is driven through multiple application and reagent stations.
11. A method according to claim 2 wherein at least some of the repetitions of (a) occur simultaneously on different array regions at respective different application stations.
12. A method according to claim 11 wherein:  
precursor units are applied in (a); and  
the web is driven through a reagent station between application stations.
13. A method according to claim 2 wherein the web is driven through multiple application stations without an intervening reagent station, and then through a reagent station.
14. A method according to claim 13 wherein the polymers are applied at the application station.
15. A method according to claim 14 wherein the polymers are biopolymers.

16. A method according to claim 10 wherein the web is driven in a continuous loop through a same application station and a same reagent station.
17. A method according to claim 2 additionally comprising driving the web through a wash station at which the web is exposed to a wash fluid.
18. A method according to claim 17 wherein the web is driven through a reagent station and a wash station after being driven through an application station, and is then driven through an application station.
19. A method according to claim 10 wherein after being driven through an application station the web is driven through multiple reagent stations and is then driven through an application station.
20. A method according to claim 9 wherein the web is driven in different directions between at least two of the reagent stations.
21. A method according to claim 2 wherein the polymers are biopolymers.
22. A method of forming arrays of polymers each having a pattern of features on a surface of a flexible elongated web, comprising:
- (a) at drop deposition station, applying a drop containing a polymer precursor unit at each feature location on the web surface so as to become linked thereto;
  - (b) at a reagent station, covering multiple features with a continuous volume of reagent which chemically reacts with the units;
  - (c) driving the flexible elongated web in a lengthwise direction through the application and reagent stations; and
  - (d) repeating (a) through (c) as needed so as to form the arrays, wherein at each feature a unit deposited in one cycle becomes linked with a unit deposited in a subsequent cycle.

23. A method according to claim 22 wherein the reagent deprotects a protected linking group of a unit deposited in a same cycle so that a unit deposited in a next cycle can link with the deprotected unit deposited in the preceding cycle.

24. A method according to claim 22 wherein the reagent comprises an oxidizing agent.

25. A method according to claim 22 wherein:  
the array is a polynucleotide array;  
the drop deposition station deposits drops containing nucleoside phosphoramidites; and  
the reagent comprises at least one of a reagent for deprotecting protected phosphoramidites or an oxidation reagent which oxidizes internucleoside phosphite bonds to phosphate bonds.

26. A method according to claim 25 additionally comprising driving the web lengthwise through a wash station following a reagent station, at which wash station multiple features are covered with a continuous volume of wash fluid.

27. A method according to claim 26 wherein the wash station is a wash bath.

28. A method according to claim 22 wherein the web is driven through multiple depositions stations and multiple reagent stations.

29. A method according to claim 22 wherein the web is driven sequentially through multiple reagent stations between different application stations.

30. A method according to claim 22 wherein the web is driven in different directions between at least two different reagent stations.

31. A method of forming arrays of biopolymers each having a pattern of features on a surface of a flexible elongated web, comprising:

- (a) at an application station, applying the biopolymers or their precursor units to the surface;
- (b) at a reagent station, contacted the web with a reagent which chemically reacts with the precursors or the web;
- (c) driving the flexible elongated web through the application and reagent stations, wherein the web is driven in different directions between an input side of the application station and an output side of the reagent station; and
- (d) repeating (a) through (c) as needed to form the arrays along the web.

32. A method according to claim 31 wherein the application station is a drop deposition station at which drops containing the biopolymers moieties or their precursor units are deposited on the web.

33. A method according to claim 32 wherein:  
precursor units are applied at the application station; and  
the web is driven through a reagent station between application stations.

34. A method according to claim 32 wherein:  
the polymers are polynucleotides; and  
the web is driven through multiple drop deposition stations and multiple reagent stations;  
the method additionally comprising driving the web through a wash station at which at which multiple features are covered with a continuous volume of wash fluid.

35. A method according to claim 34 wherein the web is driven through a reagent station followed by a wash station, between successive deposition stations.

36. A method of forming arrays of polymers each having a pattern of features on a surface of a flexible elongated web, comprising:

- (a) at an application station, applying the polymers or their precursor units to the surface;

- (b) at a reagent station, covering multiple features with a continuous volume of reagent which chemically reacts with precursors on the web;
- (c) driving the flexible elongated web in a lengthwise direction through the application station and reagent stations; and
- (d) repeating (a) through (c) as needed to form the arrays along the web;  
wherein the web is directed in a path by one or more guides each contacting a web surface along opposite edge margins while not contacting a central portion of the web intermediate the edge margins.

37. A method according to claim 36 wherein the guides rotate and contact edge margins of the web surface carrying the arrays.

38. A method of preparing a surface of a flexible elongated web to receive a biopolymer array, comprising driving the web in a lengthwise direction from a supply reel and successively through multiple surface treatment stations so as to provide a linking layer bound to the surface which layer has a polynucleotide, protein, nucleoside or amino acid minimum binding affinity of  $10^4$  to  $10^6$  units/ $\mu^2$ .

39. A method according to claim 38 wherein the linking layer is less than 10 angstroms thick.

40. A method according to claim 38 wherein the linking layer comprises any one or more of polylysine, an aldehyde, an amine, or a thiol.

41. A method according to claim 38 wherein the linking layer comprises a silane.

42. A method according to claim 41 wherein the silane has a free amino group.

43. A method according to claim 38 wherein the linking layer comprises a mixture of different silanes.

44. An apparatus for forming arrays of chemical moieties each having a pattern of features on a surface of a flexible elongated web, comprising:
- (a) at least one application station at which the chemical moieties or their precursor units are applied to feature locations on the web surface;
  - (b) at least one reagent station at which a continuous volume of reagent which chemically reacts with precursors or the web covers multiple features; and
  - (c) a web transport system which transports the web in a lengthwise direction through the application and reagent stations.
45. An apparatus according to claim 44 which has at least multiple application or multiple reagent stations.
46. An apparatus according to claim 44 wherein the application station is a drop deposition station.
47. An apparatus according to claim 44 wherein the reagent station is a reagent bath.
48. An apparatus according to claim 46 comprising multiple drop deposition stations and multiple reagent stations.
49. An apparatus according to claim 48 wherein at least one reagent station is positioned along a web transport path between different drop deposition stations.
50. An apparatus according to claim 46 having multiple application stations with no intervening reagent stations along a web transport path between at least two of the application stations.
51. An apparatus according to claim 46 additionally comprising restraints which contact both surfaces of the web on either side of the drop deposition station to assist in maintaining the web flat while in the drop deposition station.

52. An apparatus according to claim 46 additionally comprising a web tensioner to assist in maintaining a constant tension of the web while in an application station.

53. An apparatus according to claim 52 additionally comprising a web tension gauge to measure tension of the web while in an application station.

54. An apparatus according to claim 46 additionally comprising a processor, and wherein:

multiple drop deposition stations are present each of which comprises a head movable across a web in the drop deposition station, each head being independently movable in response to the processor.

55. An apparatus according to claim 44 additionally comprising a processor communicating with the drop deposition station and web transport system to coordinate deposition of drops and movement of the web through each drop deposition and reagent station.

56. A computer program product comprising a computer readable storage medium having a computer program stored thereon, for use with an apparatus for forming arrays of chemical moieties each having a pattern of features on a surface of a flexible elongated web, which program when loaded into a processor causes the apparatus to:

- (a) at an application station, apply the polymers or their precursor units to the surface;
- (b) at a reagent station, cover multiple features with a continuous volume of reagent which chemically reacts with precursors or the web;
- (c) drive the flexible elongated web in a lengthwise direction through the application and reagent stations; and
- (d) repeating (a) through (c) as needed to form the arrays along the web.